10W DAC PULSER/RECEIVER

Style 50D571 - For Type UM Reflectoscopes

OPERATING & MAINTENANCE
MANUAL NO. OM50D571

Sperry®

AUTOMATION INDUSTRIES, INC.
SPERRY DIVISION
DANBURY, CONN., U. S. A.

CONTRACT NO. N00600-70-C-0204

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MANUAL NO. OM50D571

MODEL NO... 50D571
SERIAL NO.. 1361-0
BOOK..... 2 of 3

AUTOMATION INDUSTRIES, INC.

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FEBRUARY 1970

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10W DAC PULSER/RECEIVER

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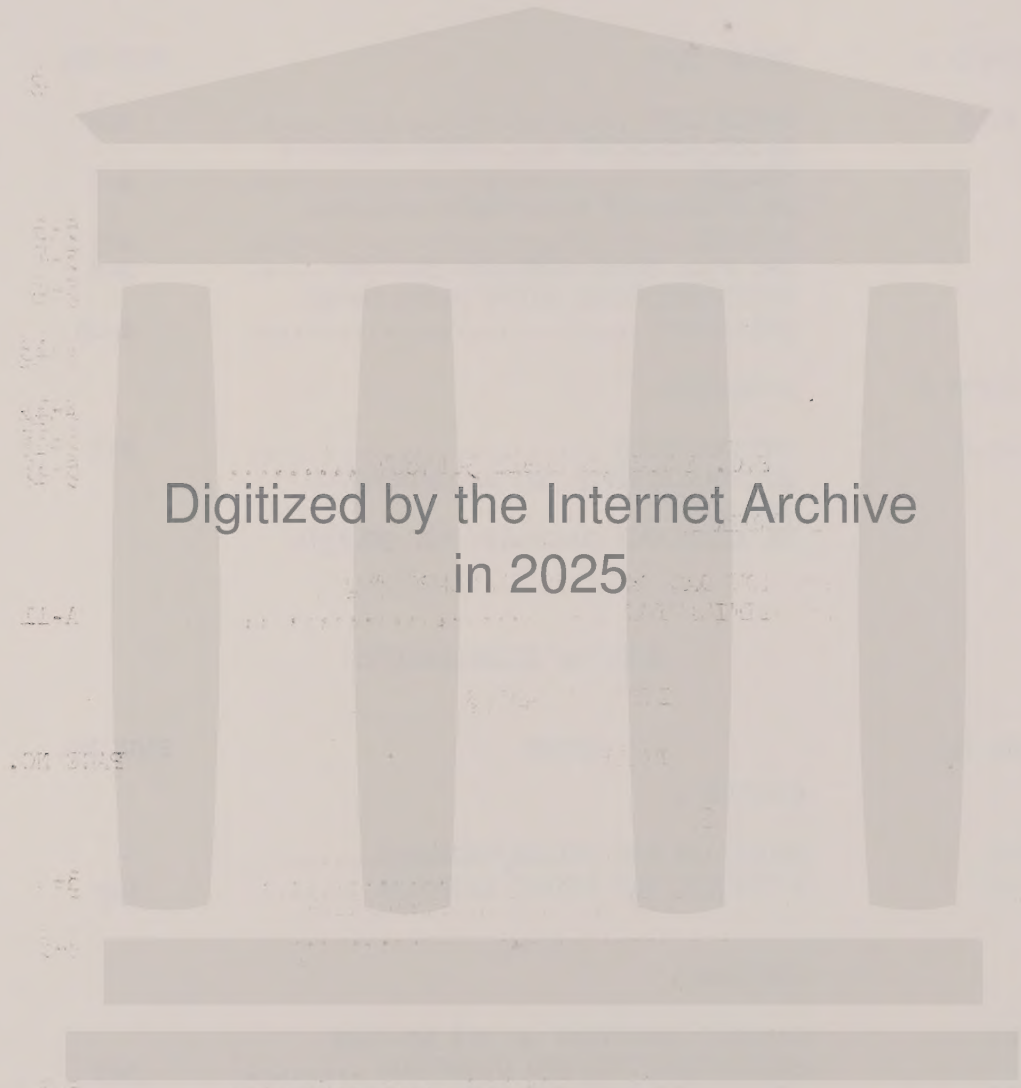

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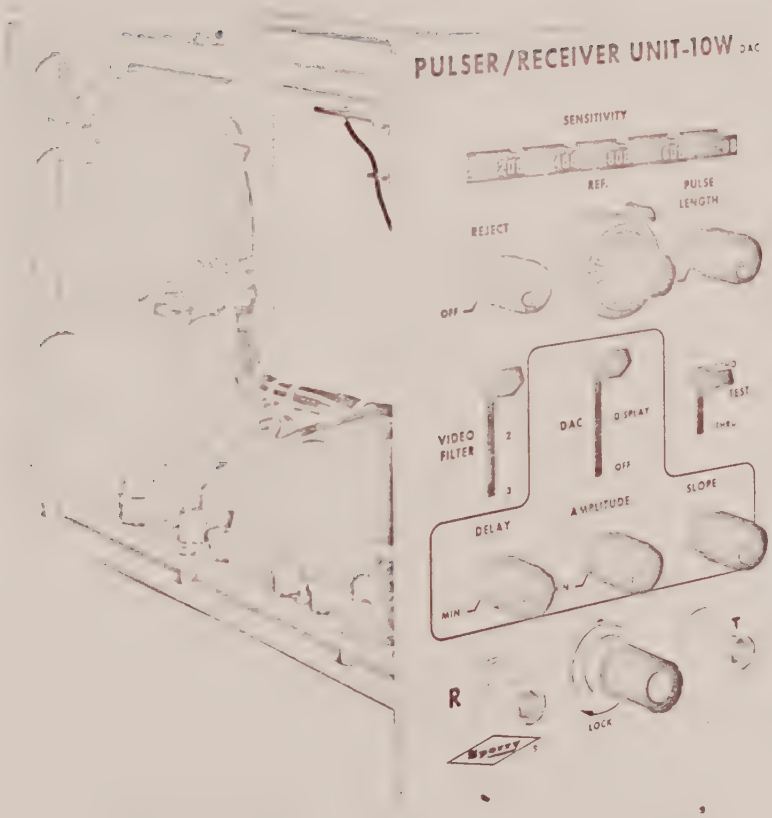


Figure 1-1 Model 10W DAC Pulser/Receiver

CHAPTER 1

INTRODUCTION

1.1 PURPOSE

The Model 10W DAC (Style No. 50D571) Pulser/Receiver Plug-in Unit is used in ultrasonic nondestructive testing. The Pulser/Receiver is designed for the generation and transmission of high frequency pulses to a transducer, for receiving, amplifying, and detecting the high frequency echoes or return pulses from the test specimen. The unit then limits and transfers the detected video pulses to the Vertical Amplifier in the UM Reflectoscope Display and any other accessory equipment in use. The numerical designator 10 in the title refers to the highest usable frequency, 10 MHz. DAC refers to Distance Amplitude Correction.

1.2 SCOPE

The various sections include a general description, preparation for use, operation, Electrical Description and Maintenance procedures for the 10W DAC Pulser/Receiver unit. Supplemental data such as parts list and schematics are included at the rear of this manual in the appendix sections.

1.3 DESCRIPTION OF EQUIPMENT

1.3.1 The 10W DAC plug-in unit is an all solid state, wide band, high performance Pulser/Receiver. It features an accurate wide range push button operated sensitivity db control. The untuned pulser and wide band receiver allows nearly flat response from 1 MHz to 10 MHz. Distance Amplitude Correction (DAC) provides correction of signal response to give essentially an equal signal response regardless of defect distance from the surface. Ultrasonic inspection, with the 10W DAC Pulser/Receiver and UM Reflectoscope, may be applied to three classes of material inspection:

a. Detection and location of internal and surface discontinuities or inhomogeneities in materials, weldments and bonds.

b. Measurement of material thickness.

c. Determination of differences in structure and physical properties.

1.3.2 Sensitivity - DB sensitivity control is a push-button operated attenuator and provides 0 to 62 db of attenuation in 2 db steps with an accuracy of 10% over the 62 db range. A ten turn vernier dial provides control for an additional 20 db of reference attenuation allowing continuous attenuation control over a total range of 0 to 82 db.

1.3.3 Video - A continuous reject control and a three position video filter provide optimum signal display.

1.3.4 Test Methods - A switch is provided to allow either pulse-echo or through transmission testing. When in the thru-transmission mode, there is 80 db isolation between pulser and receiver to insure minimum cross talk.

1.3.5 Pulser - The pulser section is completely transistorized. High voltage is available to give maximum performance with zirconate search units. Voltage PRF amplitude is constant to within plus or minus 15% from 100 Hz to 2,000 Hz.

1.3.6 Distance Amplitude Correction (DAC) - The primary function of the DAC (Distance Amplitude Correction) unit is to correct for the "near field" and "far field" response characteristic which is typical of ultrasonic tests. The "near field" zone starts at the surface of a test piece and extends to a limit determined by search unit size, type and frequency. Within this zone the amplitude of signals reflected from a given size defect (such as a #5 flat bottomed hole) will increase as a function of distance from the surface. From the "near field" limit on (far field), signals from a #5 hole will continuously decrease due to attenuation in the material under test. A plot of a typical DAC signal response is shown in Figure 1-2.

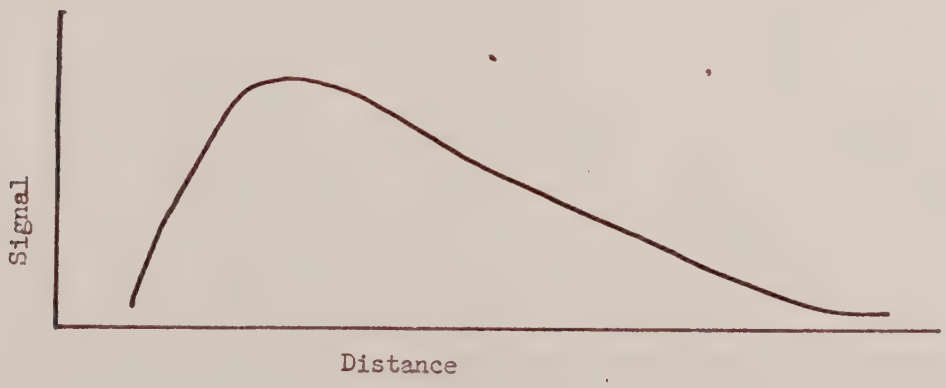


Figure 1-2 A Typical DAC Signal Response

1.4 SPECIFICATIONS

1.4.1 Mechanical Specification - The Model 10W DAC plugs into the UM Reflectoscope or Special Function Chassis and makes automatic contact with other units through a rear mounted plug. The unit is easily removed for servicing or interchanging by releasing the catch on the front panel and then pulling the unit out.

1.4.1.1 Module front plug-in size. Single width module (6-7/8" H, 4-1/2" W and 9" L).

1.4.1.2 Weight - 2.5 pounds.

1.4.1.3 The following front panel controls are provided:

a. Video

1. Sensitivity push button - 2-4-8-16-32 db.

2. Reference Vernier - 20 db.

3. Reject

4. Filter - Three position 1-2-3

b. Pulse Length

c. Test Mode - ECHO or THRU

d. Connectors - (R) Receive and (T) Transmit (BNC Connectors)

e. DAC - On, Display, Off

1. Delay

2. Amplitude

3. Slope

1.4.2 Electrical Specification

Operating Frequencies - Wideband 1 to 10 MHz

Power Requirements - All power requirements to operate the Pulser/Receiver are obtained from the UM Reflectoscope Display and Timer Units.

Vertical Linearity - 2% from 0 to 2.5 inches on CRT.

Dynamic Range - 50:1 when the signal amplitude from a No. 7 hole at 3" is full scale 2.5". The signal from a No. 1 hole at 3" is visibly breaking the base line.

Sensitivity - Contact - Search unit SFZ 57A2217, Diameter 0.5", Freq. 5MHz, Test Block, Alcoa #1, Controls P/L-Max., REF-MAX and SENS-20db. Reflectoscope signal should be 2" on CRT.

Pulser Output - Approx-110V, using SFZ Search Unit 5.0MHz, P.L. Max

Isolation Pulser/Receiver - 80 db isolation in THRU Test Mode. (Dual transducer operation).

Temperature Range - 28.9° C to 71.1° C (-20° F to 160° F).

1.4.2.1 Distance Amplitude Correction - The DAC circuitry is designed to provide a correction for Echo response such that received signals will be independent of distance from surface, and a #5 hole will appear on the UM Reflectoscope display at a constant amplitude regardless of its depth. Therefore, it is possible, for example, to set up for a given reference defect at 3 inches and know that any signal which equals this reference will be equal in effective area. The correction is effected by generating an electrical wave shape which approximates the actual distance amplitude wave, and applying it to the Pulser/Receiver to change its sensitivity in a correcting manner. The DAC wave shape is displayed on the cathode ray tube for convenience in setting up when the DAC Switch is in the Display position. The practical range of correction is 10:1. These ranges and shapes which can be generated will accommodate the majority of practical test requirements.

CHAPTER 2

PREPARATION FOR USE

2.1 GENERAL

This chapter contains unpacking, handling, installation procedures and initial Pulser/Receiver checkout procedures. These steps should be followed to assure optimum operating conditions.

2.2 UNPACKING AND HANDLING

If the 10W DAC Pulser/Receiver is shipped with a UM-771 or UM-775 Reflectoscope, the Pulser/Receiver will be secured in the proper slot within the Reflectoscope. It will be shipped in a molded rubberized hair nest within a cardboard container. If the 10W DAC Pulser/Receiver is shipped alone, it will be shipped in a cardboard container. Both of these packages have been fully tested and will absorb any normal amount of shocks due to careless handling while in shipment. Remove the units (Reflectoscope and/or 10W DAC Pulser/Receiver) and all accessories from the shipping container and perform a visual inspection. If any damage is found, immediately contact the carrier and area representative for Automation Industries Inc., Sperry Division. Do not destroy the shipping container until a satisfactory inspection has been completed. It is suggested that the shipping container be retained for future use.

2.3 PREPARATION FOR USE

For proper installation of the 10W DAC Pulser/Receiver unit for bench operation, proceed as follows:

a. The 10W DAC Pulser/Receiver does not require any special procedure for preparation for use. Simply plug it into the assigned slot in the UM-Reflectoscope or Special Function Chassis and lock unit in place.

b. Make sure that all Pulser/Receiver controls are free moving.

NOTE

Do not remove or plug in the Pulser/Receiver with the UM-Reflectoscope energized.

c. Energize UM-Reflectoscope. Power is automatically supplied to the unit from the main chassis.

d. 10W DAC Pulser/Receiver checkout references:

1. Refer to Chapter 3, Section 3.2 for operation of controls and functions.

2. Refer to Chapter 5, Section 5.3 for maintenance of the 10W DAC Pulser/Receiver.

3. Refer to UM-771/775 Reflectoscope Manual, Chapter 3, Section 3.4 for General Pulser/Receiver Operation.

CHAPTER 3

OPERATION

3.1 GENERAL

The purpose of this chapter is to give the operator instruction for control functions and operation of the 10W DAC Pulser/Receiver. It is recommended that the unexperienced operator thoroughly read and study this section prior to operating the Pulser/Receiver. For the novice operator it is suggested to read the Introduction to Ultrasonic Reflectoscope Method of Nondestructive Testing which is located in the UM-771/775 Reflectoscope Manual, Appendix B.

3.2 CONTROLS AND CONNECTORS

The controls and connectors found on the 10W DAC Pulser/Receiver are illustrated in Figure 3-1 and tabulated in Table 3-1.

Table 3-1

CONTROLS AND CONNECTORS

Item No.	Control/Connector	Function
1	DB Sensitivity (Push Buttons)	Five push buttons (2, 4, 8, 16 and 32) control the db attenuation from 0 to 62 db in 2 db increments. Push in for attenuation.
2	Reject (Control)	The REJECT control is used to block passage of low level irrelevant and noise signals for a clean CRT presentation which permits easier interpretation of echo signals.
3	Video Filter (Switch)	A three position switch marked as positions 1, 2, and 3. Position No. 1 has minimum of video filtering. Positions 2 and 3 have increased amount of filtering.
4	DAC (Switch)	A three position switch, OFF, Display and ON position. The OFF position has no effect on receiver. The Display position presents an alternate DAC trace on the CRT. This position has no effect on the receiver. The ON position has no DAC signal display on CRT, however the DAC signal effects receiver signal.

(Continued)

Table 3-1 (Cont'd)

CONTROLS AND CONNECTORS (Cont'd)

Item No.	Control/Connector	Function
5	Delay (Control)	Positions DAC signal in time on the CRT.
6	R-Receiver (Connector)	The right coaxial connector marked "R" receive is used when testing in Echo or thru transmission technique.
7	Amplitude (Control)	Amplitude control effects the height or amplitude of the DAC signal.
8	T-Transmitter (Connector)	The right coaxial connector marked "T" transmitter is used when testing in Thru-Transmission technique.
9	Slope (Control)	The Slope control effects the penetration of the DAC signal.
10	Test (Switch)	The test switch (two position) is used to select one of two possible test modes, THRU and ECHO. In the THRU position, two transducers (search units) are used; one transmits the high frequency pulse to the test specimen, the other receives the signals from the test specimen, and sends pulses to the RF Amplifier via the "R" jack. In the ECHO position, only one transducer is used and this acts as both transmitter and receiver of the high frequency pulse.
11	Pulse Length (Control)	The PULSE LENGTH control is used to adjust the time duration of the high frequency pulse applied to the transducer (search unit). It should be adjusted to maximize signal return while maintaining required resolution. The control should be left near minimum and increased only to gain signal strength if maximum sensitivity does not suffice; excessive pulse length can obscure signals from defects close to the test surface.

(Continued)

Table 3-1 (Cont'd)

CONTROLS AND CONNECTORS (Cont'd)

Item No.	Control/Connector	Function
12	REFerence (Control)	A 20 db Reference for use as required. With this control, up to 20 db's may be used as a reference setting, prior to using the db sensitivity controls.

PULSER/RECEIVER UNIT-10W DAC

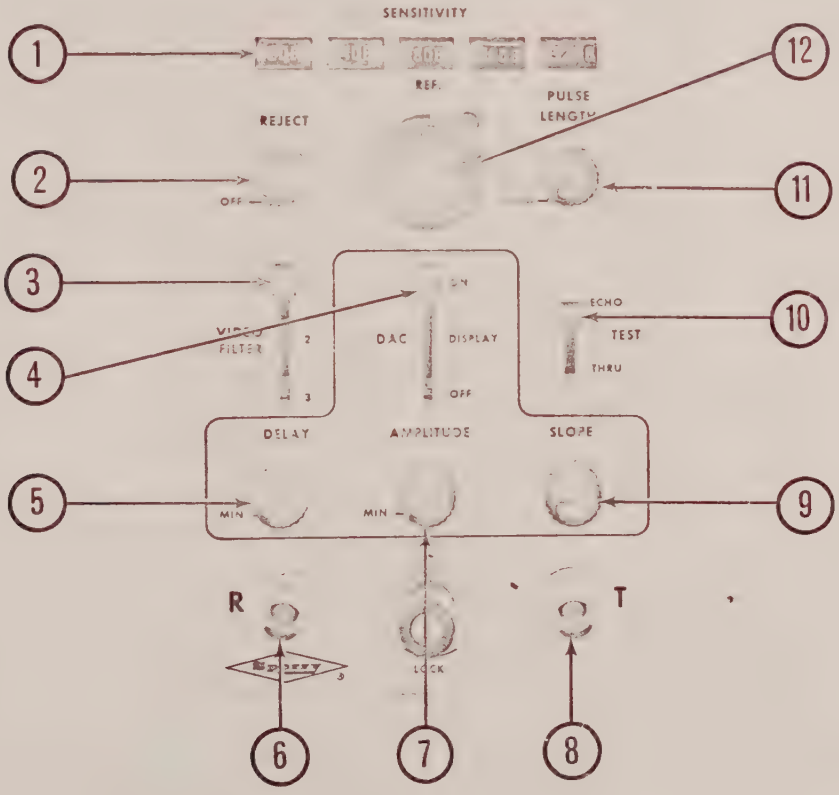


Figure 3-1 Control Locations on the 10W DAC Pulser/Receiver and Connector

3.3 OPERATION PROCEDURE

The Model 10W DAC Pulser/Receiver has a wide range of applications. Therefore, no detailed operating procedures can be given; however, a familiarization procedure which will allow the operator to see how the various controls function is provided.

NOTE

It must be kept in mind that this is not an actual operating procedure, but simply a familiarization procedure which will enable the user to properly use the unit when required to.

3.3.1 Assemble the following:

1. Search unit cable
2. Zirconate 5 MHz Search Unit
3. UM-Reflectoscope
4. A 1 inch aluminum Test Block

NOTE

Always turn power Off when plugging 10W DAC Pulser/Receiver in or out of the UM Reflectoscope.

3.3.2 Obtain a trace on the CRT with an initial and an echo pulse from the test specimen.

1. Push in SENSITIVITY buttons from 0 to 62 db and back down to 0 and note that the amplitudes of the signals decrease/increase in proportional steps. Refer to Table 3-2 for checking DB vs. Relative Amplitude Attenuation Ratio.
2. Turn the REFERENCE Control and note that it will control the amplitude of the signals over a 10:1 ratio (20db). This control is used for Reference only.

Table 3-2

DB VS RELATIVE AMPLITUDE ATTENUATION RATIO

DB VS Relative Amplitude		DB VS Relative Amplitude		DB VS Relative Amplitude	
0	100	21	8.9	42	0.79
1	89.1	22	7.94	43	0.71
2	79.4	23	7.1	44	0.63
3	70.8	24	6.3	45	0.56
4	63.1	25	5.6	46	0.50
5	56.2	26	5.0	47	0.45
6	50.1	27	4.5	48	0.4
7	44.7	28	4.0	49	0.35
8	39.8	29	3.5	50	0.32
9	35.5	30	3.16	51	0.28
10	31.6	31	2.8	52	0.25
11	28.2	32	2.5	53	0.224
12	25.1	33	2.24	54	0.2
13	22.4	34	1.99	55	0.18
14	19.9	35	1.8	56	0.16
15	17.8	36	1.58	57	0.14
16	15.8	37	1.41	58	0.126
17	14.1	38	1.26	59	0.112
18	12.6	39	1.12	60	0.1
19	11.2	40	1.0	61	0.089
20	10.0	41	0.89	62	0.079

3.3.3 Manipulate the PULSE LENGTH control and note the effect. The PULSE LENGTH control will effect the signal amplitude and will also effect the width of the initial pulse and echo signal. The amplitude will increase with increased width. Since increasing the width of the initial pulse may obscure echo signals from discontinuities close to the entrant surface, the PULSE LENGTH control should be used with discretion and increased only when the sensitivity controls cannot provide sufficient signal amplitude.

3.3.4 With the REJECT control CCW, note that the sweep outside of the initial pulse and echo signals tends not to be "clean." Small random signals from the test specimen and noise signals from the unit (grass) appear all along the sweep. By adjusting the REJECT control CW, it should be possible to clean up the sweep by eliminating all but the initial pulse and desired echo signal.

3.3.5 With the FILTER in Position 1, note the signals tend to have several cycles of R.F. information riding the return signals. By positioning Filter Switch to Position 2 and 3, return signals will be smoother, eliminating some of the R.F. seen in Position 1.

3.3.6 Distance Amplitude Correction (DAC)

a. General - Place DAC switch to Display position. Note the DAC waveform presentation. Manipulate the DAC controls and observe the DAC waveform changes. DAC controls have no effect on Receive signals. Place DAC switch to ON position. By adjusting the DAC controls, the echoes should be of equal amplitude regardless of depth.

b. Detail - Near field and far field correction. Set the DAC Switch to OFF position. By using a 1" test block, adjust the Pulser/Receiver and Timer controls such that a pattern similar to Figure 3-2 is obtained.

c. Set DAC Switch to DISPLAY position. Note DAC signals will not effect receiver signals. Adjust the Delay, Amplitude and Slope controls until a DAC signal pattern is similar to Figure 3-3.

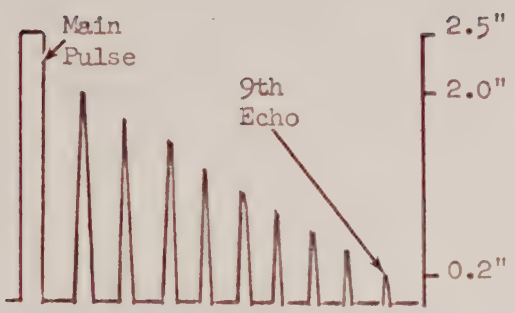


Figure 3-2 Signal Presentation With DAC In OFF Position

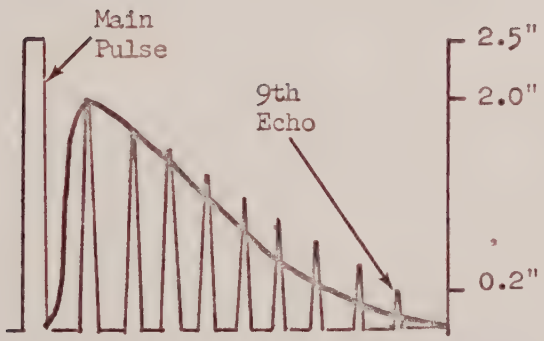


Figure 3-3 Signal Presentation With DAC In the Display Position

d. Set the DAC Switch to the ON position and take out 20 DB of Sensitivity (Push buttons no. 4 and 16 DB). If the Echo amplitudes are not uniform, readjust slightly the Delay, Amplitude, and Slope controls until a pattern similar to Figure 3-4 is obtained.

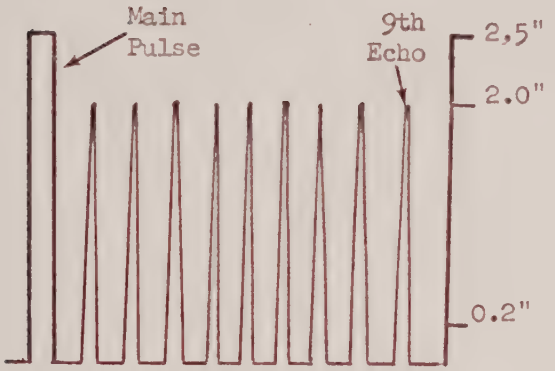


Figure 3-4 Signal Presentations With DAC In the ON Position

e. Testing with the DAC - Since every test set up has different distance amplitude characteristics, the DAC must be set up to suit the individual job by adjustment of front panel controls. The variables that affect the distance amplitude characteristic are frequency, search unit size, search unit type (i.e., focused or unfocused), and material. A DAC set up should remain fixed as long as these variables are unchanged. Once the search unit and material are selected, next determine what the distance amplitude characteristic curve is. This can be accomplished in several ways:

1. Experimentally determine the curve by using a set of test blocks, with a flat bottomed test hole of equal size drilled in each, at varying distances covering the test range. Plot the signal amplitudes from each

block, using the identical test set up to be used in practice. This curve can be marked on the CRT face with a grease pencil or a transparent overlay. Make the amplitude of the curve two inches.

2. Once the distance amplitude curve has been determined, place it on the CRT as a transparent overlay. Be sure the sweep is set to correspond to the horizontal scale of the curve, and that the curve is two inches to its peak amplitude. Set the DAC switch to Display position and adjust the DAC controls to match the DAC waveform as closely as possible to the overlay. Set the DAC switch to ON position and adjust Sensitivity Control for desired echo amplitudes. All echo signals will now be approximately the same amplitude.

3.3.7 Before attempting to test under specific requirements, study carefully the information on operating techniques given in the proceeding section of this manual and be sure to familiarize yourself with any accessory or recording equipment being used with the UM-Reflectoscope.

CHAPTER 4

ELECTRICAL DESCRIPTION

4.1 GENERAL

The following paragraphs include a general and detailed functional theory of operation of the Model 10W DAC Pulser/Receiver. During the following discussion, reference should be made to the 10W DAC Pulser/Receiver Block Diagram, Figure No. 4-1, and Schematic No. 50E623 located in Appendix B.

4.2 THEORY OF OPERATION - GENERAL

4.2.1 Pulser - The Pulser receives a timing sync signal from the UM Reflectoscope Timer unit via Pin 24 J101. The negative edge of the sync signal drives the sync inverter. A positive pulse output signal from the sync inverter triggers the Pulser. The Pulser signal output is sent to the search unit through R or T Jacks. The ultrasonic frequency is determined by the natural frequency of the search unit being used.

4.2.2 Receiver - The main pulse and back reflections are applied to the input of the first RF amplifier and attenuator driver stages. The RF output of the first three RF amplifier stages are controlled by Reference and Sensitivity controls. DAC signal is injected to the input of the 4th amplifier stage controlling the RF input levels. This is accomplished when DAC control is in the ON position. The amplified high frequency pulses are applied to the video detector circuit where the signals are converted to a video pulse. Reject function controls the bias of the detector circuit. The video pulses are then filtered, amplified and limited. The final video outputs are transferred from the 10W DAC Pulser/Receiver to the vertical input of the UM Reflectoscope Display.

4.2.3 DAC Unit - The positive pulse edge of the early sync signal at J101 Pin 13 triggers the DAC start circuit. By controlling time of the DAC one shot generator, the start of the DAC operation is delayed. At the end of this delay, a DAC signal is generated and passed to the DAC shaping circuits which contains a slope control. The output of the DAC shaping circuits have a controllable amplitude which is presented to the receiver DAC input and the display amplifier. The displayed DAC signals are triggered by negative pulse edge of the early sync through the display delay one shot trigger circuitry and on to the display one shot. After this delay another DAC signal is generated, shaped, amplitude contolled and sent to the display amplifier. The DAC display output is sent to Pin 14 J101.

4.3 THEORY OF OPERATING - DETAIL

4.3.1 Pulser - The sync inverter Q212 is triggered by the negative pulse edge of the sync signal from J101, Pin 24. The positive excursion of Collector Q212 is coupled through C223. This positive signal triggers the pulser Q216 causing the anode voltage to drop suddenly. The pulser output transition is coupled through C218. The pulse length control selects the desired pulse amplitude to J103 and to J102 through Test Switch S101.

4.3.2 Receiver - The transmit pulse and back reflections enter the wideband amplifier at J102 or J103 and then through test switch S101. The RF signals are coupled through C201 and are impressed upon limiting diodes CR201 and CR202. The front panel Reference control varies the signal input (0 - 20 db) to the first RF amplifier. This is accomplished by current limiting diodes CR203 and CR204. The diodes variable impedance attenuates the incoming RF signals to the base of Q201. A stage gain of approximately 20 db is achieved in the First RF amplifier. The RF output is coupled from the collector of Q202 to the dual Base input of Q203 and Q211. These RF stage transistors are complimentary emitter follower for driving the input to the attenuator network. The attenuator network push button Sensitivity Adjust (0 - 62 db), controls the input to the Second RF amplifier, Q204. The total controlled attenuation to this point is 0 to 82 db. CR205 and CR206 are RF limiters. The Second RF amplifier stage has a gain of approximately 20 db. The RF output from Q205 is sent to the Third and Fourth RF amplifier stages which are the same type of amplifiers as the Second RF amplifier. The total gain of the Third and Fourth RF amplifier stages is approximately 35 db. The total gain up to the input of the Detector and Reject state is approximately 75 db. The DAC signal when in the ON position is injected to the Base of Q208 (the input of the Fourth RF Amplifier) via an external connection E7 from the DAC P.C. Board. The output of the Fourth RF amplifier is impressed to the Detector and Reject stage. A positive bias controlled by the front panel reject control adjust R104 is injected at the cathode of CR212 for the desired amount of REJECT. The negative RF signals are detected at CR212 and Q210. The Video signals from the Emitter of Q210 Emitter follower is sent to a video filter circuit. The level of filtering, (positions 1-2-3), is selected by the front panel video filter switch S102. The video is coupled to the Base of Video Amplifier Q213 which has an amplification factor of approximately 10 db. The Video signals are passed from the collector of Q213 to a video limiter

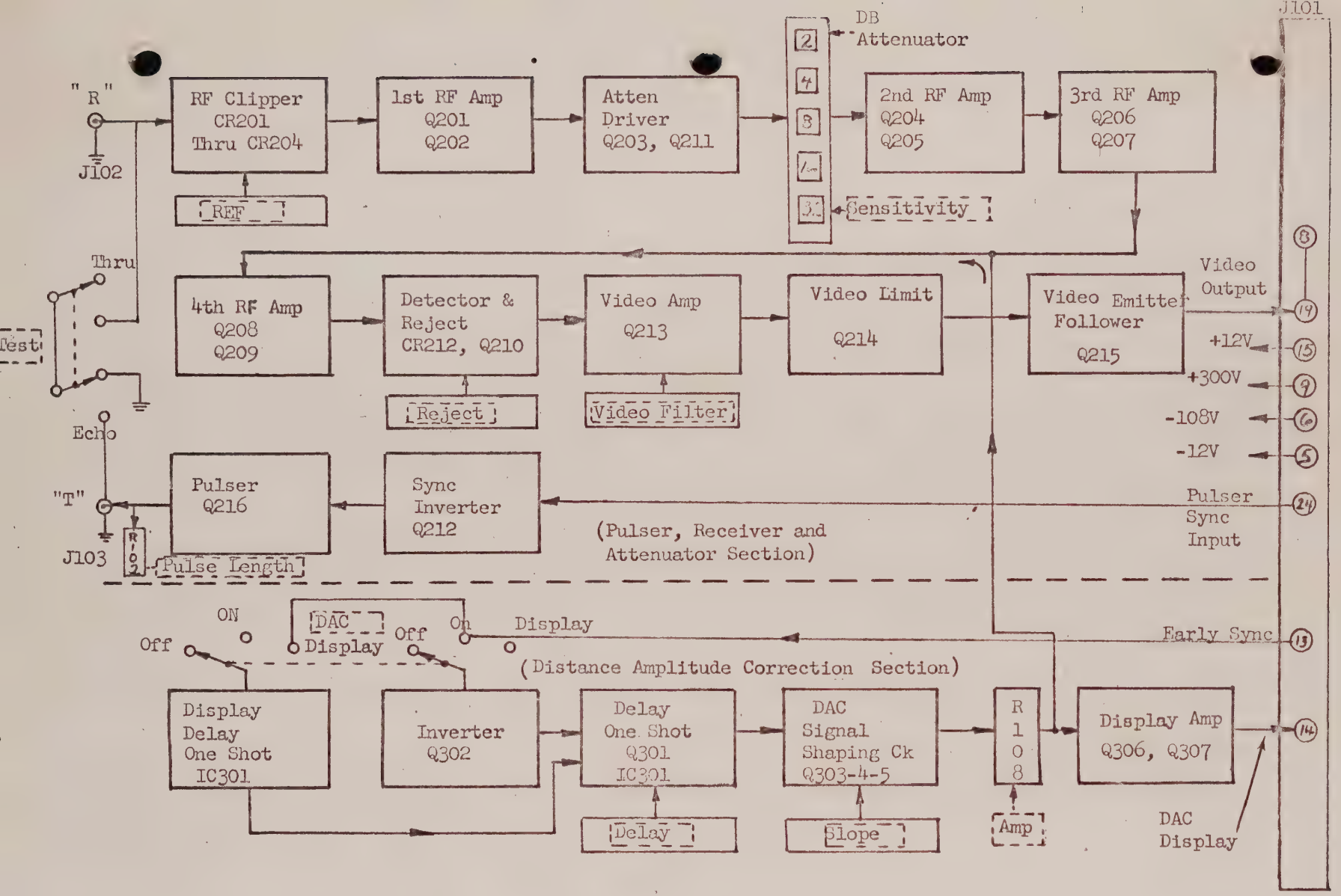


Figure 4-1 BLOCK DIAGRAM Of The 10W DAC PULSER/RECEIVER

CR211 and Q214 whose base level is adjusted by the Video limit control R258. The detected and limited video signal is impressed to the base of emitter follower Q215. Final Video signals are transferred from the 10W DAC Pulser/Receiver J101, Pin 19 and then to Pin 8. The Video output from the 10W DAC is then sent the vertical input of the UM Reflectoscope Display.

4.3.3 Distance Amplitude Correction (DAC) - The desired DAC function (OFF, DISPLAY or ON) is selected by DAC Switch S103 A or B. The DAC Switch S103 A or B receives early sync signals from J101, Pin 13. In the OFF position, early sync signals are not connected to E2 and E3 on the DAC board. In the ON position, the positive pulse edge of the sync signals switch on Q402 which in turn couples a negative transition through C410 and then couples through CR409. This action triggers pins 1,2,3,4,5, and 6 of IC401. Q401, R402, R106, and C401 comprises the delay generator for the DAC signal. At the end of the delay, Pin 6 of IC401 returns to a positive state. C402 couples this positive transition through CR402 and CR403. The positive edge of the signal rise is determined by R409 and C407. The DAC signal rate of delay is determined by the front panel SLOPE Control R107. The DAC signal having been delayed and shaped is sent to emitter follower drive Q403, Q404 and Q405. The signal is impressed upon the front panel AMPLITUDE control R108. The amplitude of the DAC signal having been selected is returned to the DAC board via Pin E6. The positive DAC signal is selected by DAC calibrate control R405. This control allows the maximum fitting of 20 db DAC signal amplitude to the input of the 4th RF receiver amplifier stage. The DAC signal at E6 is impressed on Diodes CR406 and CR407 which generate a reference voltage on R410 is proportional to the current flow in the actual gain control circuits. The signal at R410 is impressed upon the base of Q406 is inverted and sent to base of Q407. The output Display DAC signal from collector Q407 is sent to E8 and coupled to J101, Pin 14.

With DAC Switch in Display position the negative transition of the early sync signal through C405 triggers IC401 (Display Delay One Shot). The display delay consists of R413, R407 and C404. At the termination of this delay the negative transistion at IC401, pin 8 is coupled through C403, CR401 to Pin 1 of IC401. The circuit description from the delay one shot through DAC shaping circuit is the same as previously mentioned.

CHAPTER 5

MAINTENANCE

5.1 GENERAL

The following paragraphs contain information for use in preventive maintenance and troubleshooting of the Model 10W DAC Pulser/Receiver.

5.2 PREVENTIVE MAINTENANCE

Preventive maintenance consists of cleaning, visual inspection, lubrication, and recalibration. Preventive maintenance performed on a regular basis will help prevent instrument failure and will improve the reliability of this instrument. The severity of the environment which the Model 10W DAC Pulser/Receiver is subjected to will determine the frequency of maintenance.

5.2.1 Cleaning - The unit should be cleaned as often as operating conditions require. Accumulation of dirt in the instrument can cause overheating and component breakdown. Dirt on components acts as an insulating blanket and prevents efficient heat dissipation. It also provides an electrical conduction path in some instances.

5.2.2 Exterior - Loose dust accumulated on the outside of the unit can be removed with a soft cloth or small paint brush. The paint brush is particularly useful for dislodging dirt on and around the controls. Dirt which remains can be removed with a soft cloth dampened in a mild solution of water and detergent. Abrasive cleanser should not be used.

5.2.3 Interior - Dust in the interior of the instrument should be removed occasionally due to its electrical conductivity under high humidity conditions. The best way to clean the interior is to blow off the accumulated dust with dry, low velocity air. Remove any dirt which remains with a soft paint brush or a cloth dampened with a mild water and detergent solution. A cotton-tipped applicator is useful for cleaning in narrow spaces or printed circuit.

5.2.4 Visual Inspection - The unit should be inspected occasionally for such defects as broken connections, improperly seated transistors and heat damaged parts. The remedy for most visible defects is obvious; however, particular care must be taken if heat-damaged parts are located. Overheating is usually only a symptom of trouble. For this reason, it is essential to determine the actual cause of overheating before the heat-damaged parts are replaced; otherwise the damage may be repeated.

5.3 CHECKOUT, ADJUSTMENT AND RECALIBRATION

The schematic diagram of the 10W DAC Pulser/Receiver No. 50E623 indicates various control adjustments and test points which should be checked during a preventative maintenance checkout.

CAUTION

Personal safety Lethal Voltage (300V) is present. Always turn instrument OFF when changing components.

5.3.1 Test Equipment

a. Multimeter Simpson 260 or equivalent

b. Oscilloscope Tektronix 521 or equivalent

c. Servistension Style 50C549

5.3.2 Using Multimeter, check Table 5-1 input Voltages:

Table 5-1

Input Voltages to 10W DAC

Pin	Voltage	Variation
5	-12V	Plus or Minus 0.1V
6	-108V	Plus or Minus 2.0V
9	Plus 300V	Plus or Minus 5.0V
15	Plus 12V	Plus or Minus 0.1V

5.3.3 Pulser Test

5.3.3.1 Connect Scope probes to (J101-24) Pulser Sync and TF-1

a. Set PULSE LENGTH control to minimum

b. Rotate RATE Control on Timer from CCW to CW

c. Check Pulser wave form follows pulser Sync.

d. Set RATE on Timer to 1 KHz

e. Check waveforms in Figure 5-1

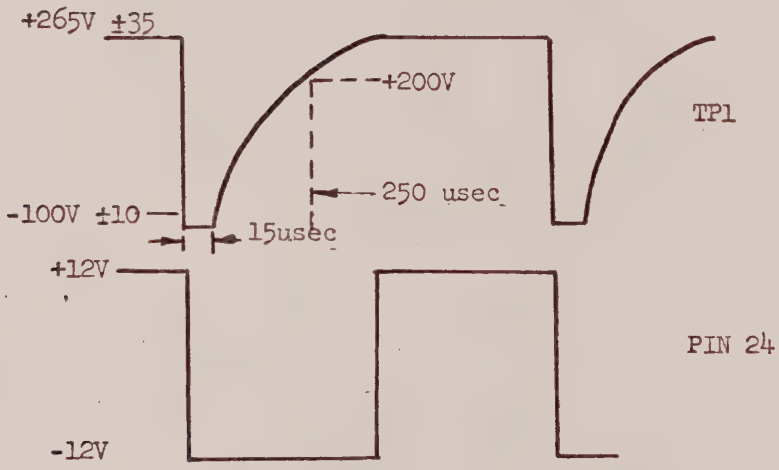


Figure 5-1 Pulser Test Waveforms

5.3.3.2 Connect Scope probe to "T" connector

a. Rotate PULSE LENGTH Control to CW

b. Negative Signal should vary from approximately -80V to -180V maximum

c. Check waveform in Figure 5-2

d. Rotate PULSE LENGTH control to MIN., Set vertical control on oscilloscope to 5V/CM.

e. Check for any positive overshoots.

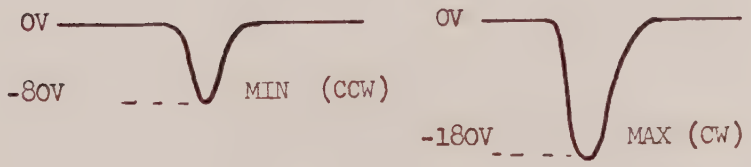


Figure 5-2 Pulse Length Checks

5.3.3.3 Connect Scope probe to "R" Connector

a. Set Test switch to ECHO position

b. A pulse signal should be present on "R" connector

c. Set Test switch to THRU position

d. Pulse signal should not be present

5.3.4 Receiver Test

a. Set the following controls:

1. Reject - OFF
2. Pulse Length - MIN
3. Video Filter - 1
4. DAC - OFF
5. Test - ECHO

b. Check the following DC Voltages (RF Amp Bias) Table 5-2

Receiver Voltage Table 5-2

Test Point	Voltage	Variation
3	Plus 1.3V	Plus or Minus 1V
6	0V	Plus or Minus 1V
7	0V	Plus or Minus 1V
8	-2.5V	Plus or Minus 1V

c. Detector Bias

1. Connect Scope probe to TP9
2. DC level should be plus 1.2V, plus or minus 0.5V
3. Rotate REJECT control CW about 1/8 turn
4. A slight negative movement in the DC level should be seen
5. Turn REJECT control OFF

d. Reject Check

1. Set REJECT control CCW, Set PULSE LENGTH to MIN.
2. Set SENSITIVITY push buttons and REF. control to obtain a 2.5" signal presentation.
3. Rotate REJECT control full CW. Signal should be fully rejected.
4. Rotate REJECT control CCW until signal just begins to break base line.

5. Set SENSITIVITY push buttons and REF. controls for a 2.5" signal presentation.

6. Rotate REJECT control - CW. Signal should drop to below 1.5".

7. By adjusting DB and REF controls, a 1" more signal should be added.

8. Turn REJECT control to OFF position.

e. Reference (REF) Calibration Check

1. Adjust REF. control fully CW (10.00).

2. Set SENS. push buttons and PULSE LENGTH control to obtain 2" signal.

3. Turn REF control fuuly CCW (0.00) Signal should diminish.

4. Set REF to (5.00) signal on. Screen should be 1" plus or minus 0.1".

5. Set REF to (10.00) signal should return to 2" level. Adjust DB SENS and Pulse controls for a 2" signal.

6. Set REF to low end (0.00). Signal should be at 0.2".

f. Video Filter Check

1. Adjust PULSE LENGTH control to CW.

2. Position signal on CRT which contain several cycles of RF information with Video Filter switch in Position 1, 2, and 3. CRT presentation should compare to Figure 5-3.

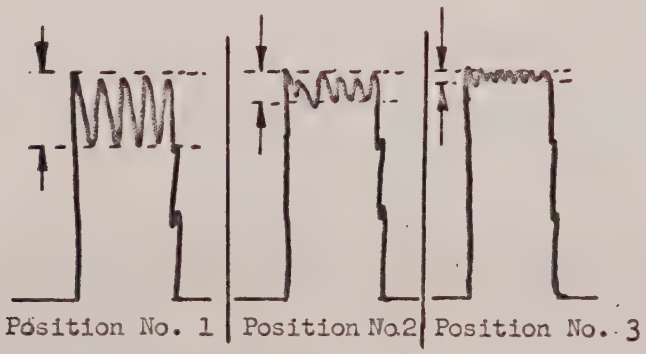


Figure 5-3 Video Filter Check

g. Sensitivity Check

1. Set the following controls:

   a. Sens. - ODB (All buttons out)
   b. Reject - OFF
   c. REF - 0.00
   d. Pulse Length - MIN.
   e. Video Filter - No. 3
   f. DAC - OFF
   g. Test - ECHO

2. Connect (5 MHz) Search Unit No. 57A2214 to "R" connector using 1" alum. Test Block.

3. Adjust PULSE LENGTH for 2" signal.

4. Push in 10 db on sensitivity control. Signal should drop to between .56" and .71".

5. Adjust PULSE LENGTH control to obtain 2" signal.

6. Repeat proceeding steps 4 and 5 until 60 db of sensitivity are in.

7. Push in the last of the 2 db (total of 62 db). Signal should drop from 2" signal to between 1.42" and 1.78".

8. Using a 2" signal refer to Section 3.3, Table 3-2 in checking db VS Relative Amplitude.

h. 10W DAC Pulser/Receiver System Response Checks - The following tables (5-3 through 5-5) are given for 10W DAC Pulser/Receiver System Response in Contact-Sensitivity (Table 5-3), Contact-Resolution (Table 5-4) and Immersed-Resolution (Table 5-5) checks.

Table 5-3

Contact - Sensitivity (Using Type SFZ Search Units)

S.U. Zirconate	Dia. (Inches)	Frequency	Test Block	P/R Controls P/L	REF	Sens	Reflectoscope Signal
57A2439	.5	1 MHz	Alcoa #4	Max	Max	30db	1.2"
57A2276	.5	2.25 MHz	Alcoa #2	Max	Max	28db	1.2"
57A2217	.5	5 MHz	Alcoa #1	Max	Max	20db	1.2"
57A2282	.5	10 MHz	Alcoa #1	Max	Max	0db	1.2"

Table 5-4

Contact - Resolution (Using Type SFZ Search Units)

S.U. Zirconate	Dia. (Inches)	Frequency	Test Block	P/R Controls P/L REF Sens	Reflectoscope Signal
57A2439	.5	1 MHz	#8 hole @ .200		Fully Resolved*
57A2276	.5	2.25 MHz	#5 hole @ .200		"
57A2217	.5	5 MHz	#3 hole @ .100	As Required	"
57A2282	.5	10 MHz	#3 hole @ .100		"
57A2439	.5	1 MHz	.100 flat plate		"
57A2276	.5	2.25 MHz	.080 flat plate		"
57A2217	.5	5 MHz	.060 flat plate		"
57A2282	.5	10 MHz	.060 flat plate		"

* Fully Resolved Defined as Signal 5X Residual

Table 5-5

Immersed - Resolution (Using Type SIZ and SIL Search Units

Search Unit	Dia. (Inches)	Frequency	Test Block	P/R Controls P/L REF Sens	Reflectoscope Signal
SIZ	.750	1 MHz	#8 hole @ .400	As Required	Fully Resolved
SIZ	1.00	2.25 MHz	#8 hole @ .200	" "	" "
SIL	.375	5 MHz	#8 hole @ .075	" "	" "
SIL	.375	10 MHz	#8 hole @ .075	" "	" "
SIL	.375 (Focus)	10 MHz	#8 hole @ .050	" "	" "

i. Distance Amplitude Correction (DAC) checks:

1. Set the following controls:

Reject - OFF
PULSE LENGTH - MIN Position
Video Filter - 3 Position
Test Switch - Echo Position
DAC Switch - OFF Position
DAC Delay - MIN Position
DAC Amp - Mid Position
DAC Slope - Mid Range

2. Voltage Checks:

E9	- 12 V
E10	- (GND)
E1	- plus 12 V
Anode of VR - 6A	plus 6V plus or minus 0.5 V

3. Place one probe on Early sync. Pin 13, J101, place other probe on Pin 9 (IC103). Place DAC Switch to Display Position. An integrated signal P to P amplitude of 9V riding on a plus 3V level should be present.

4. Place probe on Base of Q1, a plus 5V signal should appear. This signal should vary in width from 8 usec to 190 usec by rotating DELAY control.

5. Place probe at Base of Q3. Signal should be approximately plus 3.5V amplitude. Width of the signal should vary from 75 usec to 400 usec with rotation of SLOPE control.

6. Place probe at E6. By rotating AMPLITUDE control, amplitude of signal should vary from 0 to plus 3V.

7. Place DAC Switch to "ON" position. Place probe at Pin 6 (IC301). A negative signal of 5V on 5 volts varying in width from 8 to 190 usec with rotation of DELAY control.

8. Place probe at TP-1.A plus 5V signal varies in start and width with DELAY and SLOPE controls.

9. Place probe at E7. Positive portion of early sync varying in amplitude from 0 to plus 1 volt with rotation of AMP Control.

5.4 TROUBLESHOOTING

5.4.1 Troubleshooting is the process by which the cause of a malfunction is discovered by means of a systematic procedure. Most malfunctions which will occur in the 10W DAC Pulser/Receiver will be electrical in nature. First, a thorough knowledge and understanding of the Pulser/Receiver instrument is a prerequisite. Second, suspected malfunctions such as switches and controls could be in the wrong position.

Table 5-6

TROUBLESHOOTING GUIDE

MALFUNCTION	PROBABLE CAUSE	REMEDY
10W DAC Completely Inoperative	No Voltages at J101	Check input D.C. power supplies
Pulser Inoperative	No Sync at J101 (24) Defective Q212 or Q216 No +300V	Replace Q212 or Q216 Check +300V at J101, Pin 9
No Video Signals	Transistors in the Video Section	Replace transistors Check the gain of each RF amp section
DELAY Control (DAC) Inoperative	IC301 or Q301 defect.	Replace IC301 and Q301.
SLOPE Control (DAC) Inoperative	Q303, Q304, or Q305 defective	Replace Q303, 304 or 305.
AMP Control (DAC) Inoperative in Display Position	Q306 or Q307 Defective	Replace Q306 or Q307

5.4.2 The following will help to localize a particular trouble to a single printed circuit board:

a. Troubleshooting Chart (5-6).

b. Photographs (Figure 5-4 thru 5-7, P.C. Board Assemblies and Components Identification).

CAUTION

Turn UM-Reflectoscope OFF when inserting or removing 10W DAC Pulser/Receiver.

c. Always begin troubleshooting by making a visual inspection of the three P.C. Boards and associated circuits. Check for any loose or burned components. Check for any loose wire connection, connectors not mating correctly, and any other related source of trouble. If the particular trouble cannot be localized, replace the printed board circuit.

CAUTION

Avoid shorting power supply voltage or components when measuring voltages or waveforms.

5.4.3 Test and Associated Equipment - The following test and associated equipment is required for troubleshooting the 10W DAC Pulser/Receiver:

a. Servistension, Style 50C549.

b. Tektronix 531 or equivalent recently calibrated.

c. Simpson Model 260, recently calibrated.

CAUTION

Personal Safety Warning. Lethal Voltage (300V) is present. Always turn instrument OFF when changing components. Always keep one hand in the clear when making temporary connections (connecting test leads, etc.).

5.4.4 Replacement of Defective Part - All electrical components are accessible for replacement from the three P.C. boards and 10W DAC chassis components.

The 10W DAC Pulser/Receiver P.C. boards are single etched circuit boards and electrical components are hold-through mounted. Before the component is removed from the P.C. board, special consideration should be followed:

a. Use low heat soldering iron (35 to 55 watts and less than 700°F usable temperature).

b. Use small diameter solder (60/40). Clean the surrounding area thoroughly after Rosin solder is used.

NOTE

Do not use Acid Cord Solder.

c. Care should be taken to avoid damage to the circuit board by applying too much heat or solder. Avoid ripping the Printed Board conductor leads.

d. If small diodes are to be removed or reinstalled, use a heat sink between the soldering iron and the component lead.

e. If the component is burnt, chip off the leads, flush to the P.C. Board and remove unclipped leads from opposite side of P.C. Board.

f. Clear solder hole on the P.C. Board.

g. Reinstall component leads and clip to proper length.

h. Resolder component, again avoid excess heat.

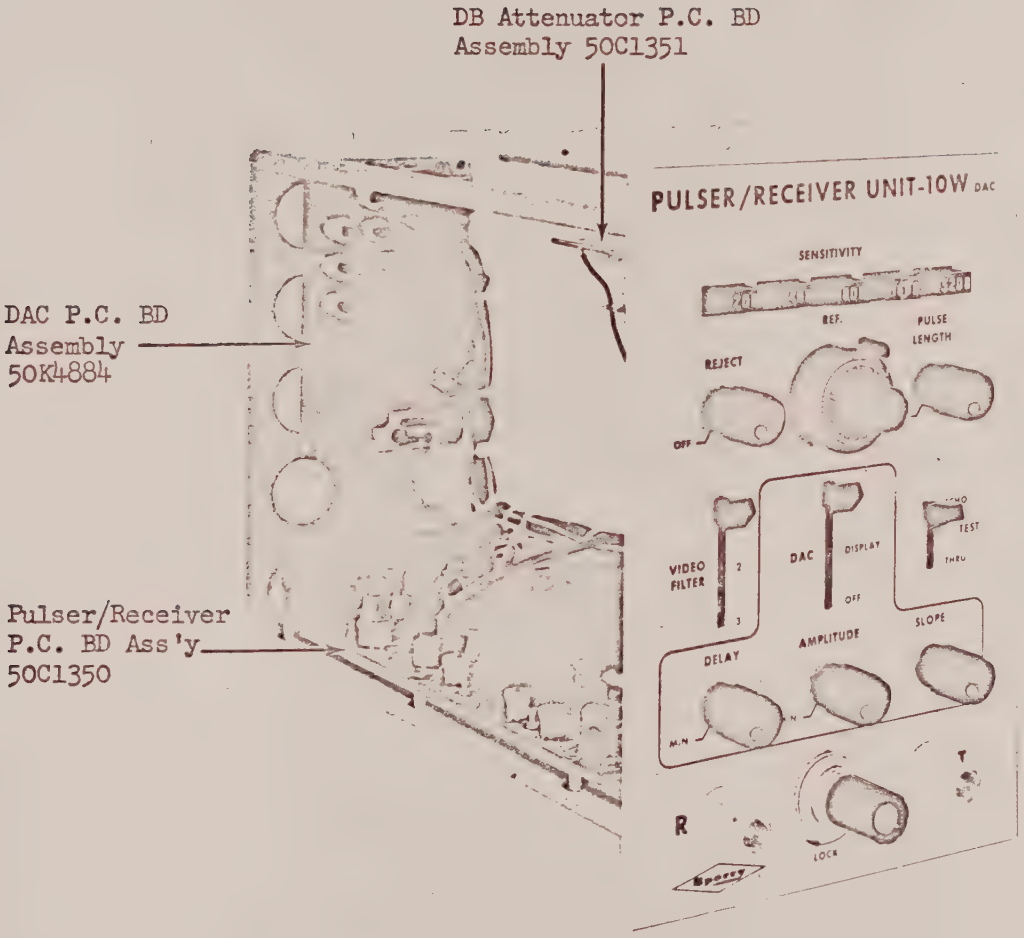


Figure 5-4 10W DAC Pulser/Receiver Front Panel and P.C. Board Assembly Identification

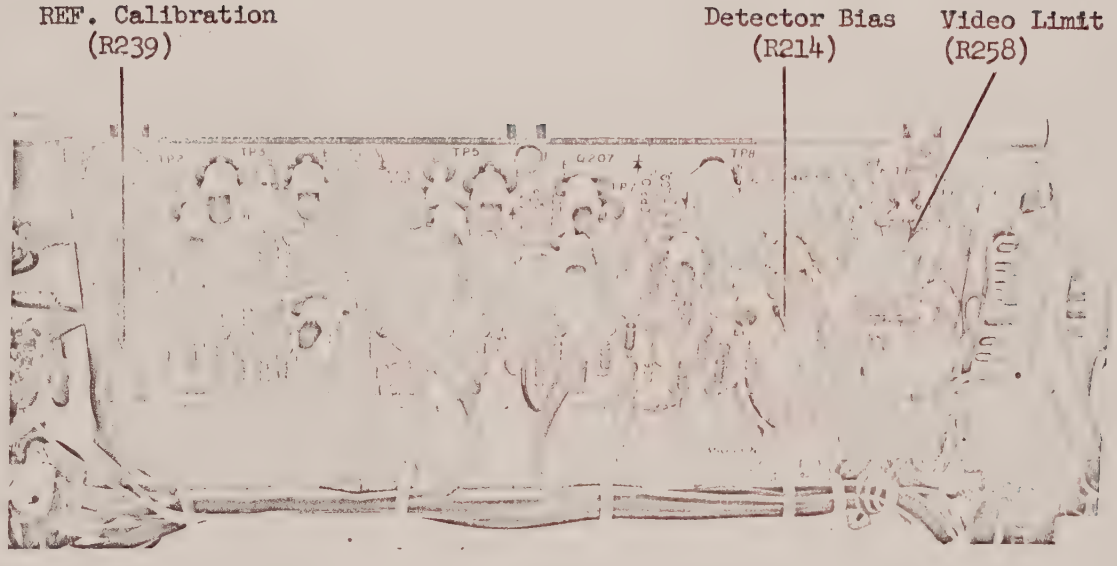


Figure 5-5 Pulser/Receiver P.C. Board Assemly 50C1350

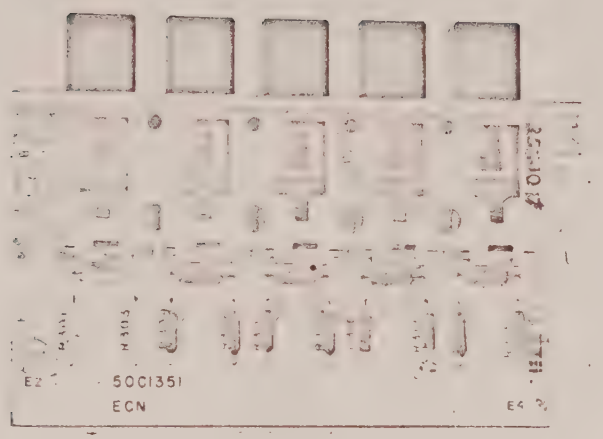


Figure 5-6 DB Attenuator P.C. Board Assembly 50C1351

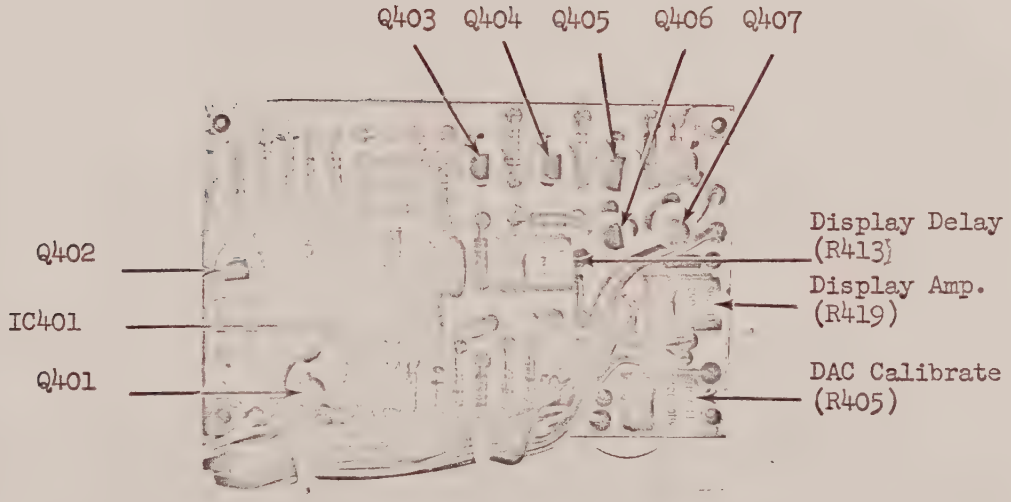


Figure 5-7 DAC P.C. Board Assembly 50K4884

APPENDIX A

PARTS LIST

A1.0 INTRODUCTION

A1.1 This section contains for ordering and replacing parts for the 10W DAC Pulser/Receiver Unit.

A1.2 The majority of all electrical components capacitors, resistors, transistors, etc. are clearly marked on the two Printed Assembly Boards, No. 50C1350 and 50C1351. For parts identification, a breakdown list will be included. Components other than a three Printed Assembly Boards will be identified by parts breakdown list and photo with parts identification.

A2.0 ORDERING INFORMATION

A2.1 In ordering a replaced part from Sperry Division, address the parts order list or inquiry to the Automation Industries, Inc., Sperry Division, Danbury, Conn., U.S.A., and supply the following information:

a. Sperry Instrument model number.

b. Serial number.

c. Desired quantity of parts.

d. Schematic symbol, part number and description.

A3.0 TABLE OF BOARD NUMBERS (Table A-1)

A3.1 The below list of P.C. board assembly numbers are tabulated according to assembly numbers, and are arranged in descending alpha-numberical order. The board assembly number appears on each page of the Parts List.

Table A-1

P.C. Board Assembly Identification

Board No.	Title	Page No.
50C1350	Pulser/Receiver P.C. Board Assembly	A-3
50C1351	DB Attenuator P.C. Board Assembly	A-7
50K4884	DAC P.C. Board Assembly	A-8

A4.0 PARTS LIST (Table A-2)

A4.1 Table A-2 contains a list of parts in Alpha-numerical order and under the particular P.C. board assembly number (See Table A-2). The following information is given:

a. Title and P.C. Board assembly number.

b. Schematic Symbol.

c. Part Number.

d. Description.

A4.2 Schematic unit symbols (resistors, capacitors and etc.) are written on two P.C. Board assemblies for easier identification and location purposes.

Description of component parts given in Table A-2 and A-3 are as complete as possible to help assist in procurring the part other than Sperry Division. However, many parts are manufactured only by Sperry Division and therefore are available at Sperry. Contact the Automation Industries, Inc., Sperry Division, Danbury, Conn., U.S.A., Sales/Service Department.

A4.3 For parts identification other than P.C. board assembly parts breakdown, additional parts list will be included in this Appendix (see Table A-3).

A4.4 This will include parts breakdown photo and parts list. The following information for each item is given:

a. Assembly number.

b. Schematic Symbol

c. Part number.

d. Description

Table A-2

Parts Breakdown List

Pulser/Receiver P.C. Board Assembly 50C1350

Schematic Symbol	Part Number	Description
C201	5GA-Q82	Cap 82pf IkV Sprague
C202	196D157X0004FB	Cap 150uf 4KV Sprague
C203	TG-S10	Cap .01uf 50V Sprague
C204	5GA-D10	Cap .001uf 1KV Sprague
C205	T360C686M015AS	Cap 68uf 15V Kemet
C206	Same as C204	
C207	Same as C203	
C208	5GA-T10	Cap 100pf 1KV Sprague
C209	Same as C203	
C210	Same as C204	
C211	196D105X0035DB	Cap 1uf 35V Sprague
C212	5GA-T22	Cap 220pf 1KV Sprague
C213	196D225X0020EB	Cap 2.2uf 20V Sprague
C214	Same as C213	
C215	Same as C213	
C216	Same as C213	
C217	Same as C211	
C218	Same as C204	
C219	19C241	Cap .01uf 500V Sprague
C220	Same as C205	
C221	5GA-Q10	Cap 10pf 1KV Sprague
C222	Same as C213	
C223	5GA-T33	Cap 330pf 1KV Sprague
C224	Same as C208	
C225	TE-1500	Cap 1uf 150V Sprague
C226	Same as C205	
C227	Same as C205	
C229	196D106X0020EB	Cap 10uf 20V Sprague
CR201	1N914	Diode
CR202	Same as CR201	
CR203	Same as CR201	
CR204	Same as CR201	
CR205	CGD1032	Diode

Table A-2
(Cont'd)

Parts Breakdown List

Pulser/Receiver P.C. Board Assembly 50C1350

Schematic Symbol	Part Number	Description
CR206	Same as CR205	
CR207	Same as CR205	
CR208	Same as CR205	
CR209	Same as CR201	
CR210	Same as CR201	
CR211	Same as CR201	
CR212	Same as CR201	
CR213	Same as CR201	
CR214	Same as CR201	
L201	9230-52	RF Choke 22uh J.W. Miller
L202	Same as L201	
L203	Same as L201	
L204	Same as L201	
L205	9230-64	RF Choke 68uh J.W. Miller
R201		Resistor 1/4W plus or minus 5% 2K
R202		Resistor 1/4W plus or minus 5% 1K
R203		Resistor 1/4W plus or minus 5% 1.1K
R204		Resistor 1/4W plus or minus 5% 360 ohms
R205		Resistor 1/4W plus or minus 5% 47 ohms
R206	Same as R203	
R207	Same as R204	
R208		Resistor 1/4W plus or minus 5% 620K
R209	Same as R203	
R210	Same as R210	
R211		Resistor 1/4W plus or minus 5% 330K
R212		Resistor 1/4W plus or minus 5% 430 ohms
R213		Resistor 1/4W plus or minus 5% 51 ohms
R214	SH-2521	Pot plus or minus 10% 2.5K A-B
R215	Same as R203	
R216		Resistor 1/4W plus or minus 5% 1.5K
R217		Resistor 1/4W plus or minus 5% 4.7 ohms
R218		Resistor 1/4W 510 ohms

Table A-2
(Cont'd)

Parts Breakdown List

Pulser/Receiver P.C. Board Assembly 50C1350

Schematic Symbol	Part Number	Description
R219	Same as R203	
R220	Same as R218	
R221	Same as R203	
R222	Same as R203	
R223		Resistor 1/2W plus or minus 5% 620 ohms.
R224		Resistor 1/4W plus or minus 5% 24K
R225	Same as R201	
R226		Resistor 1/4W plus or minus 5% 12K
R227		Resistor 1/4W plus or minus 5% 100 ohms
R228		Resistor 1/4W plus or minus 5% 82 ohms
R229	Same as R217	
R230	Same as R227	
R231	Same as R228	
R232		Resistor 1/4W plus or minus 5% 5.1K
R233	Same as R227	
R234	Same as R228	
R235	Same as R232	
R236	Same as R227	
R237		Resistor 1/4W plus or minus 5% 75 ohms
R238		Resistor 1/4W plus or minus 5% 150 ohms
R239	SH-1021	Pot plus or minus 10% 1K A-B
R240		Resistor 1/4W plus or minus 5% 2.7K
R241		Resistor 1/4W plus or minus 5% 11K
R242	Same as R205	
R243	Same as R240	
R244		
R245	Same as R240	
R246	Same as R218	
R247		Resistor 1/4W plus or minus 5% 1.8K
R248	Same as R201	
R249		Resistor 2W plus or minus 5% 150K
R250	Same as R218	

Table A-2
(Cont'd)

Parts Breakdown List

Pulser/Receiver P.C. Board Aseembly 50C1350

Schematic Symbol	Part Number	Description
R251	Same as R202	
R252		Resistor 1/4W plus or minus 5% 1.6K
R253	Same as R201	
R254		Resistor 1/4W plus or minus 5% 220 ohms
R255	Same as R232	
R256	Same as R240	
R257		Resistor 1/4W plus or minus 5% 300 ohms
R258	Same as R214	
R259	Same as R237	
R260	Same as R260	
R261	Same as R247	
R262		Resistor 1/4W plus or minus 5% 330 ohms
R263		Resistor 1/4W plus or minus 5% 2.7 ohms
R264	Same as R227	
R265		Resistor 1/4W plus or minus 5% 3.6K
	MPT-4003	Socket Transistor I.E.H.C.
	MPT-6003	Socket Transistor I.E.H.C.

Table A-2

Parts Breakdown List (Cont'd)

DB Attenuator P.C. Board Assembly 50C1351

Schematic Symbol	Part Number	Description
R301	RN55D4320F	Resistor 432 ohms
R302	RN55D11R5F	Resistor 11.5 ohms
R303	Same as R301	
R304	RN55D2210F	Resistor 221 ohms
R305	RN55D23R7F	Resistor 23.7 ohms
R306	Same as R304	
R307	RN55D1150F	Resistor 115 ohms
R308	RN55D52R3F	Resistor 52.3
R309	Same as R307	
R310	RN55D68R1F	Resistor 68.1 ohms
R311	RN55D1540F	Resistor 154 ohms
R312	Same as R310	
R313	Same as R308	
R314	RN55D1001F	Resistor 51 ohms 1/4W plus or minus 5%
R315	Same as R308	
R316		Resistor 51 ohms 1/4W plus or minus 5%

Table A-2

Parts Breakdown List (Cont'd)

DAC P.C. Board Assembly 50K4884

Schematic Symbol	Part Number	Description
C401	DM19-392-J	Cap 3900PF
C402	DM19-252-J	Cap .0025uf
C403	DM10-301-J	Cap 300pf
C404	Same as C401	
C405		Cap 100pf
C406		Cap. 200pf
C407		Cap. 510pf
C408		Cap. 2.2uf Polarized
C409	KE68E15	10uf 15 WK
C410	Same as C405	
C411		150uf 15V
C412	Same as C409	
CR401	Doide	IN914A
CR402	Doide	IN270
CR403	Same as CR402	
CR404	Same as CR402	
CR405	Same as CR401	
CR406	Same as CR401	
CR407	Same as CR401	
CR408	Same as CR401	
CR409	Same as CR401	
CR410	Same as CR401	
CR411	Doide	VR6A
IC401		MC7400P
Q401	2N3906	
Q402	2N3904	
Q404	Same as Q401	
Q404	Same as Q401	
Q405	Same as Q402	
Q406	Same as Q402	
Q407	Same as Q401	

Table A-2

Parts Breakdown List (Cont'd)

DAC P.C. Board Assembly 50K4884

Schematic Symbol	Part Number	Description
R401		Resistor 10K 1/4W
R402		Resistor 470 ohms 1/4W
R403	Same as R401	
R404		Resistor 5.1K 1/4W
R405	SH5021-AB	Pot 5K
R406	Same as R401	
R407		200 ohms 1/4W
R408		20K 1/4W
R409	Same as R401	
R410		Resistor 1K 1/4W
R411	Same as R410	
R412		Resistor 51 ohms 1/4W
R413	SH1021	Resistor 1K
R414	Same as R401	
R415	Same as R401	
R416	Same as R401	
R417		Resistor 47K 1/4W
R418		Resistor 4.7K 1/4W
R419		Resistor 1K 1/4W
R420	Same as R410	
R421		Resistor 5K
R422	Same as R410	
R425	Same as R401	

Table A-3

Parts Breakdown List

Front Panel 10W DAC Pulser/Receiver (See Figure A-1)

Schematic Symbol	Part Number	Description
C101	5GA-T10	Cap 100pf 1KV Sprague
C102	5GA-T22	Cap 220pf 1KV Sprague
J101	26-4100-24P	Connector Amphenol
J102	UG-657/U	BNC Conn. Tarnish Res. Kings
J103	Same as J102	
R101		Resistor 30 ohms 1/4W plus or minus 5%
R102	GAIN040-P502RA	Pot 5K Allen Bradley
R103	3507S-1-500	Pot 50 ohms 10 Turn Bourns
R104	GAIN040-P102MA	Pot 1K Allen Bradley
R105		Resistor 13 ohms 1/4W plus or minus 5%
R106		25K
R107		25K
R108		500 ohms
S101	50A4166	Lever Switch 2 pos.
S102	50A3991	Lever Switch 3 pos.
S103	Same as S101	

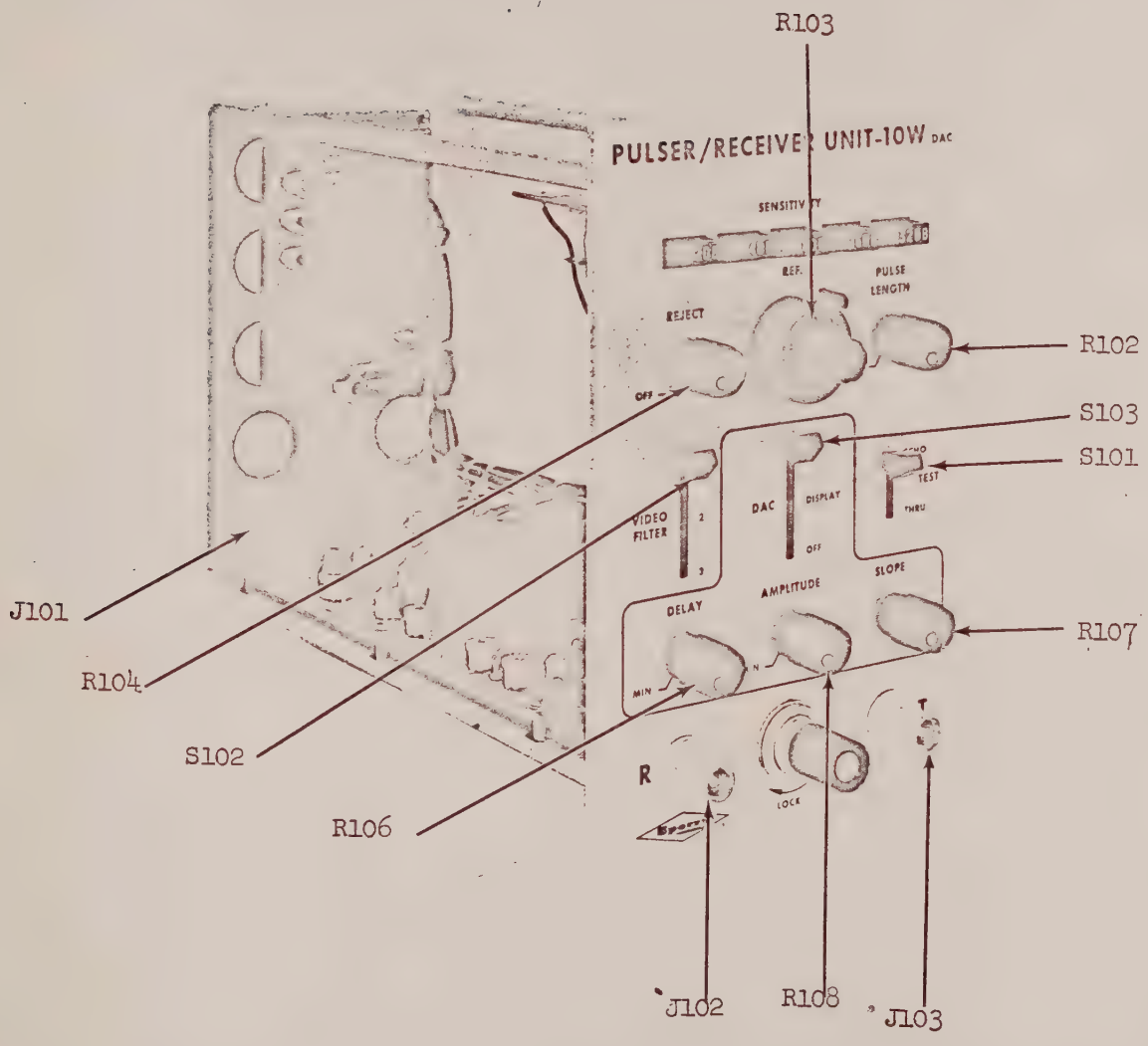


Figure A-1 The 10W DAC Front Panel Component Identification

APPENDIX B

SCHEMATIC

A1.0 INTRODUCTION

This section contains a foldout overall 10W DAC Pulser/ Receiver Schematic No. 50E623 and a single page DB Attenuator Schematic No. 50C1374. This section is supplied to supplement the information present in the 10W Pulser/ Receiver Text.

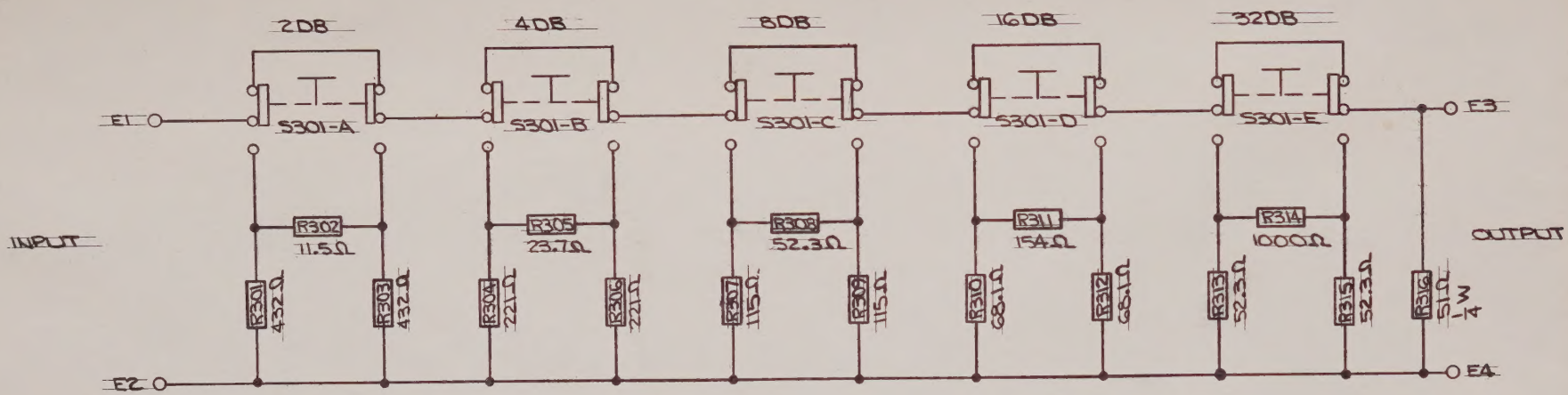
A1.1 The 50E623 Schematic is laid out to show the overall circuit function of the 10W DAC Pulser/Receiver. The schematic provides technical information about the electrical value and identification of capacitors, resistors, transistors, transformer diodes and etc. Input and Output DC voltages and signals are shown on the Schematic. These voltages and signals measuring points are shown on the Schematic as "E" numbers. All three P.C. Boards and Controls are tied together through "E" numbers.

A1.2 The 10W DAC Pulser/Receiver is broken down in three sections, as shown on the schematic. Certain number series also are associated with the components within the assembly.

a. Pulser/Receiver P.C. Board Assembly and controls

b. DB Attenuator P.C. Board Assembly and controls

c. DAC P. C. Board Assembly and controls



NOTES:

1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE $\frac{1}{8}$W, ±1%.

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ITEM NO.	DWG. OR PART NO.	NAME	QUA REQ

BILL OF MATERIAL

SCALE — EXCEPT AS NOTED — DEC. ± — FRAC. ± — ANGLES ± — MACH. ✓

50C1351 REF. ASS'Y. NO.

MAT. OR P. SPEC.

AUTOMATION INDUSTRIES, INC.
SPERRY PRODUCTS DIVISION
DANBURY, CONNECTICUT • U.S.A.

D.B. ATTENUATOR SCHEMATIC

Sperry 50C1374

CID 8-26-69 R 9-26-69

DRAWN BY DATE MFG. CHECK BY DATE

Zdravic 9-18-69

CHK. DATE E.C.N. NO.

BEAVERITE
BEAVER FALLS, N.Y
MADE IN U.S.A
9C11-39
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